

## CLAIMS

What is claimed is:

1. In a generator including a permanent magnet generator, the combination of:  
a generator housing;  
a stator housing within said generator housing, said stator housing outer surface being fitted with external fins, said fins surrounded by a sleeve extending generally axially from front to rear along said stator housing external surface;  
a stator winding within said stator housing;  
a hollow shaft rotatably mounted within said stator housing, said shaft having an air channel communicating therethrough an inlet end and an outlet end;  
a fan mounted on said hollow shaft;  
a cylindrical aluminum sleeve mounted inside said hollow shaft;  
means for rotating said shaft;  
whereby said stator housing is fit within said generator housing such that there is a space between said housings and when said generator is in operation, said fan draws cooling air forward through said cylindrical aluminum tube in said rotor shaft and ejects said air through said space between said stator housing and said generator housing over said stator housing external fins into the atmosphere; and thereby cools said generator.
2. The generator of claim 1 further comprising an air filter.
3. The generator of claim 2, wherein said air filter is self-cleaning.

4. The generator of claim 1 further comprising permanent magnets mounted on said shaft.
5. The generator of claim 4 wherein said magnets are held in place on said rotor shaft by a shaped metal alloy.
6. The generator of claim 5 wherein said shaped metal alloy is Nitinol 60.
7. The generator of claim 4 wherein said magnets are held in place by a plurality of magnet retention rings that are configured to secure said magnets to said shaft, said retention rings being fitted around said shaft and threadedly connected to said shaft.
8. The generator of claim 7 wherein said magnets include a plurality of permanent magnets arranged in a plurality of rows that extend around the circumference of said shaft and said magnets are further held in place by at least one magnet spacer ring that is configured to fit between two of said rows and secure said magnets to said shaft; and said spacer ring being fitted around said shaft.
9. The generator of claim 4 wherein said magnets include a plurality of permanent magnets arranged in rows that extent around the circumference of said shaft ,said magnets being placed such that the opposite poles of adjoining magnets face each other the generator further comprising interpole spacers placed between adjoining magnets; and said interpole spacers being threadedly connected to said shaft.

10. In a generator including a permanent magnet generator, the combination of:
- a generator housing,;
  - a stator housing within said generator housing, said stator housing outer surface being fitted with external fins, said fins surrounded by a sleeve extending generally axially from front to rear along said stator housing external surface;
  - a stator winding within said stator housing;
  - a hollow shaft rotatably mounted within said stator housing, said shaft having an air channel communicating therethrough an inlet end and an outlet end;
  - a fan mounted on said hollow shaft;
  - a cylindrical aluminum sleeve mounted inside said hollow shaft;
  - means for rotating said shaft;
  - a refrigeration compressor and refrigeration coils mounted within said rotor shaft ;
  - whereby said stator housing is fit within said generator housing such that there is a space between said housings and when said generator is in operation, said fan mounted on said rotor shaft functions only as cooling air for said stator housing and forces cooling air through said space between said stator housing and said generator housing over said stator housing external fins into the atmosphere and said refrigeration coils cool said shaft releasing the heat to the atmosphere; and
  - thereby in conjunction with the air forced through said space between said stator housing and said generator housing cools said generator.